REVOLVING FLAT CARDS

AND

DRAWING FRAMES

H & B AMERICAN MACHINE CO.

PAWTUCKET, R. I.

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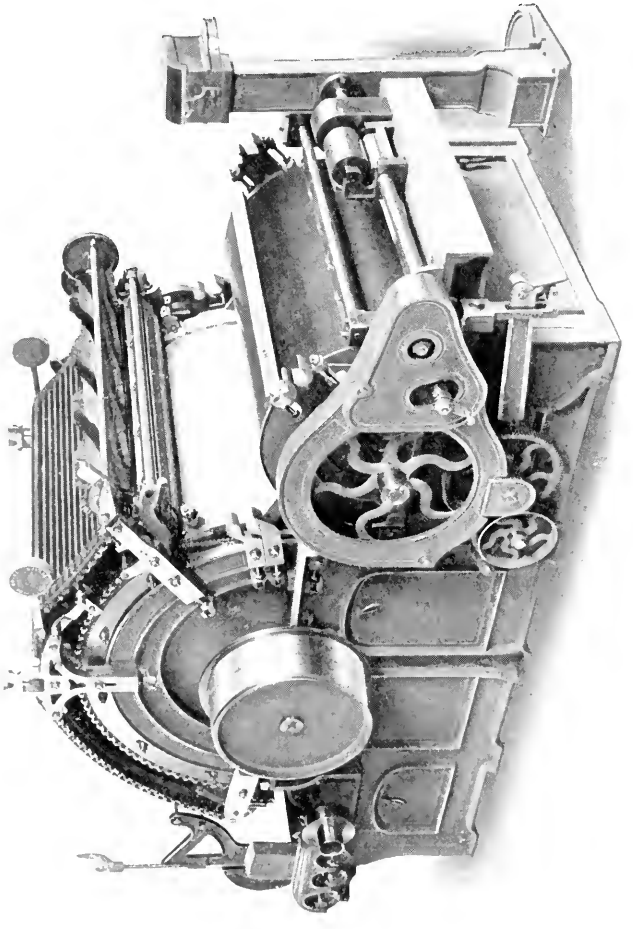
REVOLVING FLAT CARDS



REVOLVING FLAT CARD (RIGHT HAND)

REVOLVING FLAT CARDS.

Our Cards are extensively used, and have won for themselves a high reputation for the quality and quantity of work they will do, the small percentage of waste made, and their durability and simplicity.

CHARACTERISTICS.

1—Rigid Bend, mathematically correct at all stages of wear of the wire.

2—Perfect concentricity of Flats to Cylinder. Cylinder Pedestals are adjustable.

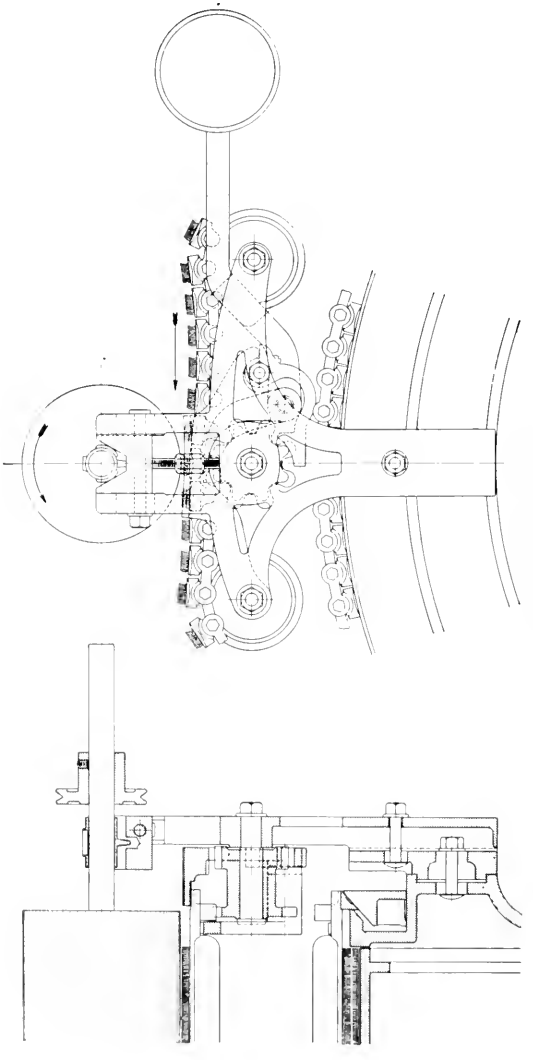
3—Arrangements for adjusting Flats whereby accuracy to the thousandth part of an inch is obtained.

4—Better quality of yarn made from the same cotton, or equally good yarn made from cheaper cotton.

5—Card Clothing throughout is of best Hardened and Tempered Steel Wire, Plough Ground or Needle Pointed.

6—Patent Top Flat Grinding Arrangement for grinding from the working seating of the Flats.

7—Patent Flat Stripping Motion, which insures perfect stripping without damage to the Clothing on the Flats.



FLAT GRINDING MOTION

The following paragraphs briefly describe some of the points of advantage in the design and construction of our machines:

CYLINDERS AND DOFFERS are carefully balanced at a high speed and are ground after being turned, making a perfectly true surface for the Card Clothing.

GOOD SELVAGES—Both Cylinders and Doffers are clothed to the extreme edges, which prevents ragged selvages.

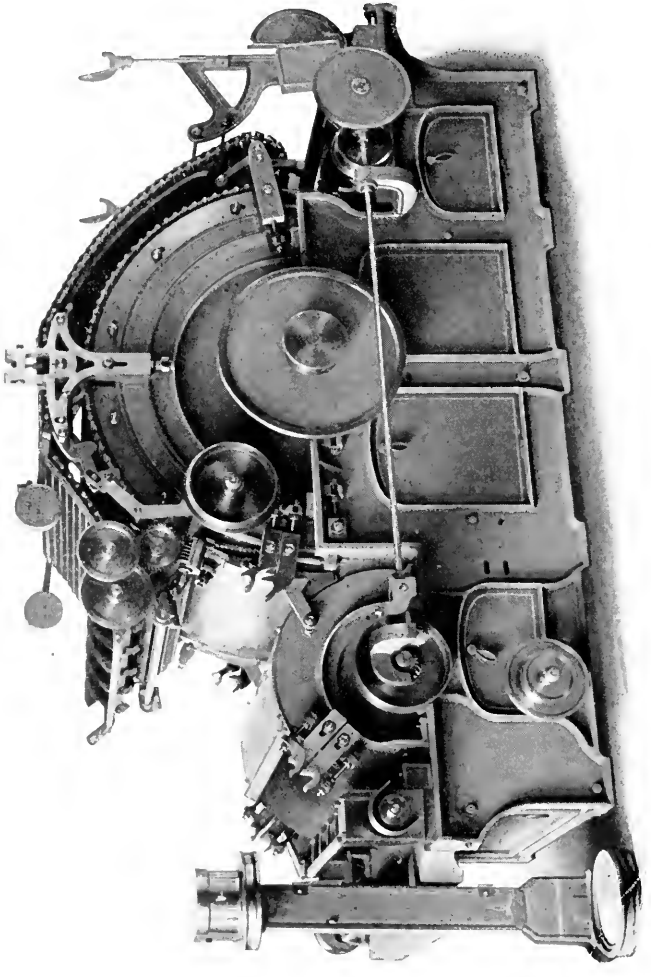
PROTECTION OF CLOTHING—The Doffers are provided with flanges to protect the Clothing, keep the edges firm and prevent the wire from being knocked down. Turned iron flanges on the Bends, and Segment Rings fixed to the inside of the lower part of the framing protect the edges of the Cylinders all the way round. The Doffers are made $\frac{3}{8}$ in. wider than the Cylinders in order to keep the edges of the latter clean.

PREVENTION OF ACCUMULATION OF FLY—The Segment Rings which are fitted close to the edges of the Cylinder project in such a way as to form a circle two inches larger than the diameter of the Cylinder. The Underscreens are attached to these Segment Rings, and this arrangement makes it impossible for fly to collect inside the Screens or about the edges of the Cylinders and Doffers.

ELECTRICAL TESTS—All Bends and Flats are tested at our works by special electrical apparatus, and this method of testing gives greater accuracy than can be obtained in any other way. More accurate Bends and Flats make closer settings possible.

PERCENTAGE AND ALL CASING-OFF PLATES are made of steel, polished and bent to conform to the surface of the cylinder. Each plate is set by gauge to the Cylinder, and the closing up of all air spaces makes the accumulation of fly and cloudy carding impossible.

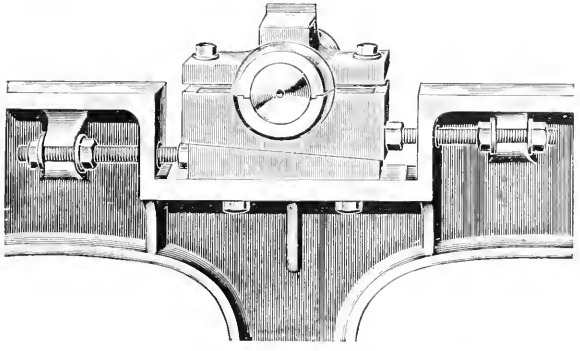
ADJUSTMENTS—Convenient adjusting arrangements with setting screws and lock nuts are provided for the Knife Plates, Doffers and Licker-ins. These are all on the outside of the machine and are accessible and easily adjusted.



REVOLVING FLAT CARD

LICKER-IN SHIELDS—To prevent the accumulation of fly around the bearings and pedestals and the climbing of oil over the ends of the Licker-in onto the clothing, we supply stationary shields at each end.

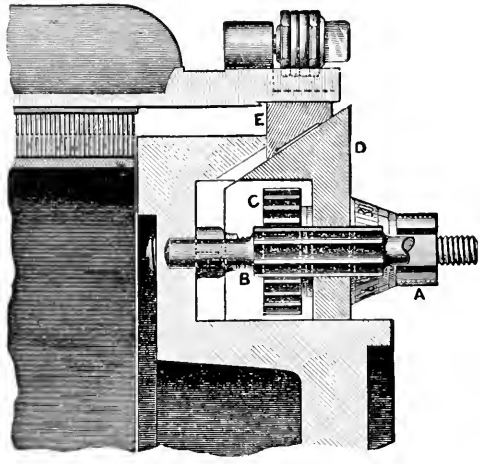
UNDERSCREENS AND FEED PLATES—Our Underscreens are specially heavy and well constructed, and our Feed Plates are very carefully finished and fitted. We supply special Underscreens and Feed Plates for long staple cotton.



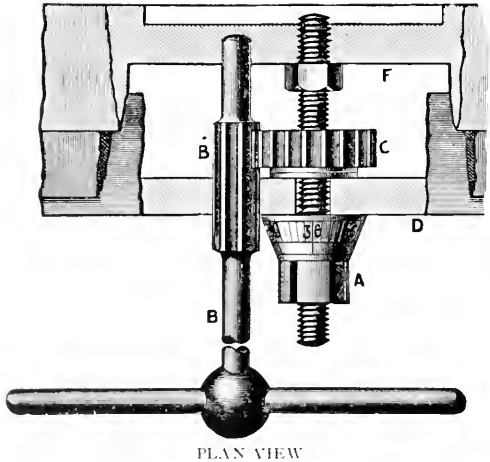
ADJUSTABLE CYLINDER PEDESTALS—The bearings for the Cylinders are made of phosphor bronze and the pedestals are adjustable either vertically or horizontally. This is a very important point, because the concentricity of the Cylinder with the Bends can be maintained as the bearings wear. The construction of our Card side is such that a very rigid support is given to the pedestals.

FLAT RELEASE—This is a very simple and convenient attachment to the Flat Driving Arrangement, which makes one of the worm gears loose on its shaft and enables the Flats to be easily turned by hand with a suitable wrench.

CONICAL BUSHINGS—The Cylinders are fastened onto the shafts by means of split conical bushings which are forced into place and prevent any possibility of the Cylinders working loose.



SECTIONAL VIEW



PLAN VIEW

PATENT SETTING ARRANGEMENT FOR FLATS

PATENT SETTING ARRANGEMENT FOR FLATS.

The cuts on page 8 are sectional and plan views of this arrangement.

A—Index Nut which bears against outside of Rigid Bend D.

B—Setting Key with fluted teeth, which gear into the teeth on Nut C.

C—Toothed Steel Nut which bears against the inside of Rigid Bend D.

D—Rigid Conical Bend which is moved in or out.

E—Flexible Conical Bend which rests on D and carries the Flats.

As the Index Nuts A and the Toothed Nuts C are turned one way or the other, they move the Rigid Bend D in or out, and thus raise or lower the Flexible Bend E.

The Flats rest on the Flexible Bend E and are raised or lowered with it. Each division on the Index Nuts A represents $\frac{1}{1000}$ part of an inch, and by turning these Nuts one division, the Flats are raised or lowered to this extent.

Our Patent Conical Concentric Bends have five setting points on each side of the machine. The Bends and Flats can be kept perfectly concentric with the Cylinder at every point until the Clothing is worn out. No other arrangement has secured such occuracy nor has any adjustment yet been invented which approaches this one for reliability and simplicity.

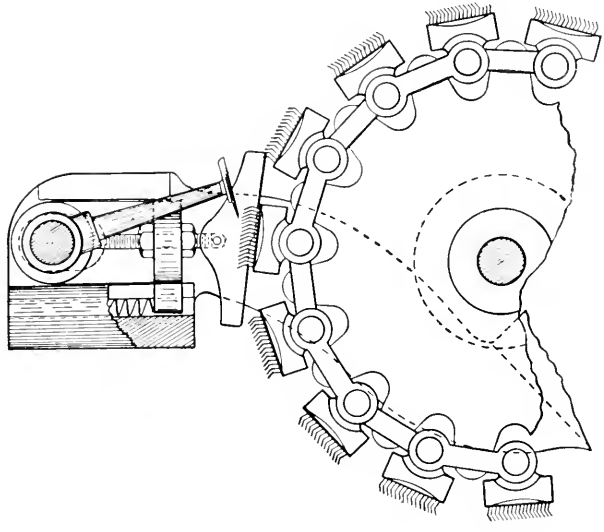
When the Flats are once set they remain set, and cannot be tampered with. Special wrenches are required for turning the Index Nuts A and Lock Nuts C, and if these wrenches are kept by the one who has charge of the settings, no unauthorized person can change same.

Close accurate settings enable our Card to do the finest quality of work and at the same time give the maximum production.

WILLIAMS PATENT STRIPPING MOTION.

This Motion enables the Card to do better work and increases the life of the Flat clothing.

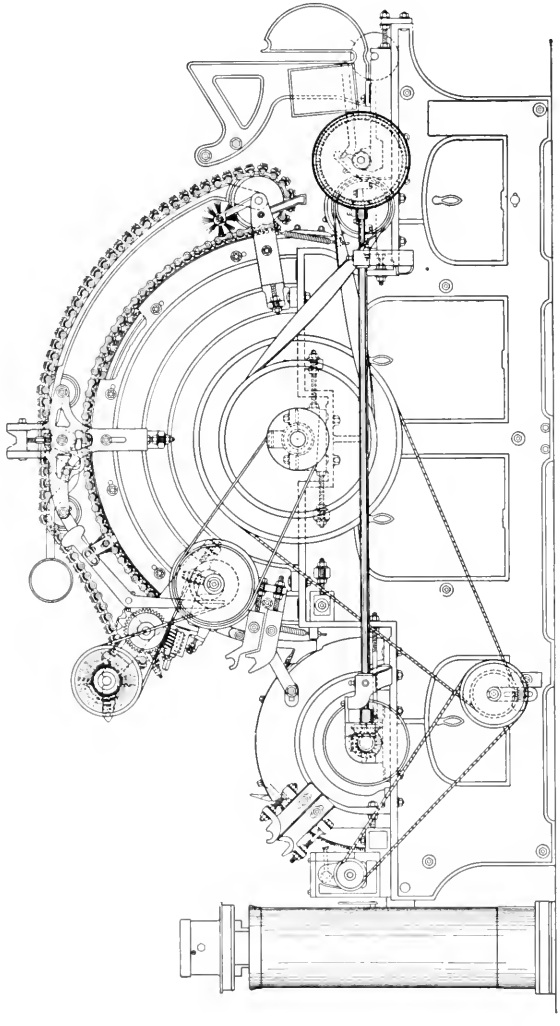
Perfect Flat Stripping can only be obtained with a Motion which keeps the Comb at an even and fixed distance from the wire clothing at all points over the entire width of the Flat. The Williams Patent Stripping Motion, for which we hold sole



rights for America, meets this essential requirement and therefore does what no other Motion has succeeded in doing. In the old system, the Comb is kept at a fixed distance from the framing of the machine, which is correct as long as there is no variation in the position of the Flats as they pass under the Comb. In practice, it is impossible to

prevent a certain amount of tilting or raising of the Flats, due to the wearing of the chains and sprockets and also to dirt getting under the Flats. With the Williams system the stripping is perfectly done no matter what the tilting may be, and even if the Flats are forced away from their true position through any cause, the Comb follows the Flat and maintains its distance. There is no comb which will not catch and damage the wire if the setting becomes too close on account of the clearance not being kept uniform.

In the Williams Stripping Motion the Comb stock is mounted at each end in bearings which slide in guides away from or toward the Flats. The accurate setting of the Comb is maintained by means of shoes which press against the working seatings of the Flats and govern the position of the sliding Comb stock bearings. The shoes have adjusting screws to regulate the setting of the Comb, and the shape of the shoes is such as to allow for the heel of the flat. The sliding bearings of the Comb stock are pressed inward by springs which keep the shoes against the working seatings of the Flat. The Comb blade is given a receding motion which effectually strips all impurities from the wire. This action, together with the fact that it is impossible for the wire on the Flats to be forced into the Comb through the accumulation of dirt or fly on the blocks or Flat seatings, makes this Stripping Motion the most perfect on the market.



REVOLVING FLAT CARD

STANDARD DIMENSIONS.

Cylinder, 50 in. dia. on iron.

Doffer, 26 in. dia. on iron.

Licker-in, 9 in. dia., clothed with inserted metallic Saw Teeth.

110 Flats, 43 of which are working on the Cylinder at the same time.

HAND OF MACHINE—Cards are usually built Right Hand, i. e., with driving pulleys on right hand side when facing feed or lap. Left hand machines are built when specified.

DRIVING PULLEYS—20 in. dia., 3⅛ in. face, T. & L.

SPEED—Cylinder, 160 to 170 r. p. m., usually 165 r. p. m.

PRODUCTION—This is determined by the quality of carding required and the kind and grade of cotton used, and varies largely.

American	600	to	1,200 lbs. in 60 hours.
Egyptian	400	to	650 lbs. in 60 hours.
Sea Island	200	to	400 lbs. in 60 hours.
Peeler	300	to	600 lbs. in 60 hours.

FLOOR SPACE.

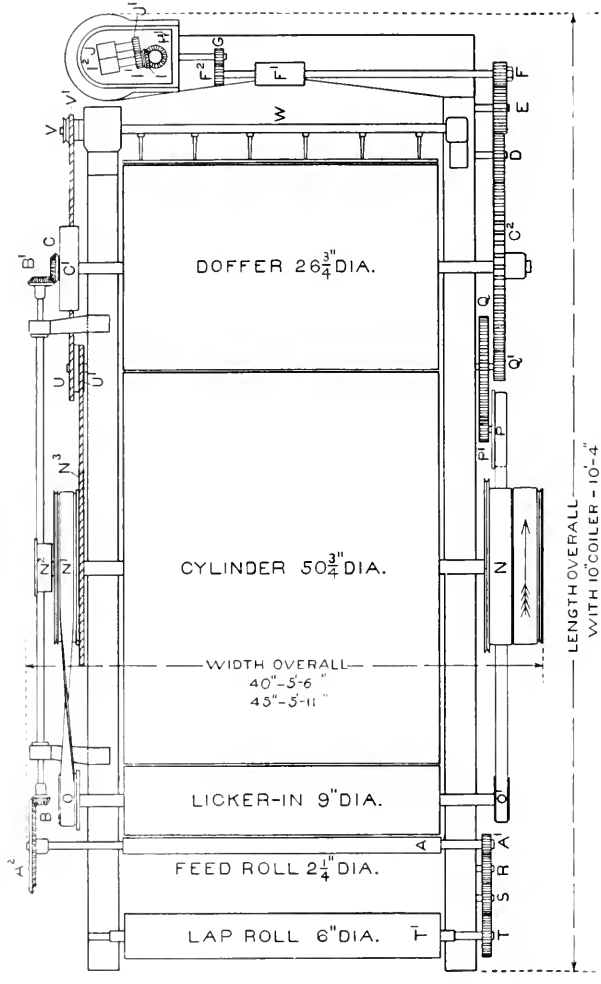
Length of Card over all (10-in. coiler) 10 ft. 4 in.

Length of Card over all (12-in. coiler) 10 ft. 5 in.

Width of Card, 40 in. wide on wire (40 in. to 41 in. lap) 5 ft. 6 in.

Width of Card, 45 in. wide on wire (45 in. to 46 in. lap) 5 ft. 11 in.

See page 14 for floor plan.


DOFFER 26¾" DIA.
CYLINDER 50¾" DIA.
WIDTH OVERALL
40"-5'-6"
45"-5'-11"
LICKER-IN 9" DIA.
FEED ROLL 2¼" DIA.
LAP ROLL 6" DIA.
LENGTH OVERALL
WITH 10" COILER - 10'-4"
" 12" " - 10'-5"
PLAN OF REVOLVING FLAT CARD

REVOLVING FLAT CARD.

ALPHABETICAL REFERENCES TO DRAWING.

A Feed Roll, 2¼ in. dia.
A¹ Feed Roll Spur Gear, 17 Teeth.
A² Large Plate Bevel Gear, usually 120 Teeth.
B Draft Change Gear, 10 to 30 Teeth.
B¹ Side Shaft Bevel Gear, 22 Teeth / 34.
C Doffer Bevel Gear 22 Teeth } or 24.
C¹ Grinding Pulley, 11 in. dia., 2¾ in. face.
C² Doffer Gear, 180 Teeth.
D Disengaging Intermediate Gear, 51 Teeth.
E Calender Intermediate Gear, 51 Teeth.
F Calender Change Gear, 18 or 19 Teeth.
F¹ Bottom Calender, 2⅞ in. dia.
F² Coiler Driving Gear, 24 or 25 Teeth.
G Coiler Change Gear, 16 Teeth.
G¹ Coiler Driving Bevel Gear, 20 Teeth.
H¹ Coiler Top Upright Bevel Gear, 20 Teeth.
I Coiler Calender Bevel Gear, 20 Teeth.
I¹ 1st Coiler Calender Spur Gear, 20 Teeth.
I² 1st Coiler Calender, 2 in. dia.
J 2nd Coiler Calender, 2 in. dia.
J¹ 2nd Coiler Calender Spur Gear, 20 Teeth.
N Driving Pulley, 20 in. dia., 3⅛ in. face; Band Pulley, 21¾ in. dia.
N¹ Licker-in Driving Pulley, 19 in. dia., 2¼ in. face.
N² Flat Driving Pulley, 6½ in. dia., 3¼ in. face.
N³ Comb Driving Band Pulley, 22 in. dia. for $\frac{5}{16}$ in. dia. band.
O Licker-in Driven Pulley, 7 in. dia., 2¼ in. face.
O¹ Barrow Gear Driving Pulley, 6 in. dia., 2⅛ in. face.
P Barrow Gear Driven Pulley, 9 in. dia., 1½ in. face.
P¹ Barrow Spur Gear, usually 26 Teeth, also 24 and 28 Teeth.
Q Doffer Lever Intermediate Gear, 104 Teeth.
Q¹ Doffer Change Gear, 17 to 40 Teeth.
R 1st Lap Roll Intermediate Gear, 40 Teeth.
S 2nd Lap Roll Intermediate Gear, 40 Teeth.
T Lap Roll Gear, 48 Teeth.
T¹ Lap Roll, 6 in. dia.
U, U¹ Double Band Intermediate Pulley for Comb { 9⅜ in. dia. / 6 in. dia.
V, V¹ Comb Box Pulley { 3⅜ in. dia. / 4⅛ in. dia.
W Doffer Comb.

REVOLVING FLAT CARD.

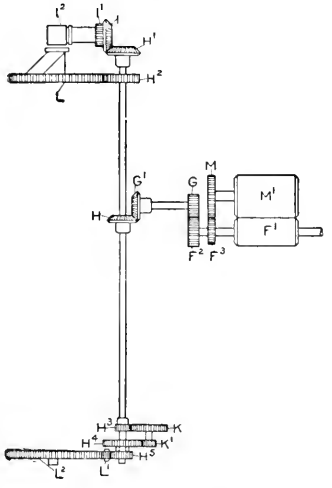


DIAGRAM OF CARD COILER GEARING

F^2 Coiler Driving Gear { 24 Teeth for 10-in. Coiler. / 25 Teeth for 12-in. Coiler.
F^3 Top Calender Driving Gear, 23 Teeth.
G Coiler Change Gear, 16 Teeth.
G^1 Coiler Driving Bevel Gear, 20 Teeth.
H Coiler Middle Upright Bevel Gear, 20 Teeth.
H^1 Coiler Top Upright Bevel Gear, 20 Teeth.
H^2 Tube Gear Driving Gear, 25 Teeth.
H^3 Upright Shaft Can Bottom Driving Gear, 15 Teeth.
H^4 / H^5 { Coiler Double Intermediate Gears { 44 Teeth. / 15 Teeth
I Coiler Calender Bevel Gear, 20 Teeth.
I^1 1st Coiler Calender Spur Gear, 20 Teeth.
I^2 1st Coiler Calender, 2 in. dia.
K / K^1 { Coiler Double Intermediate Gears { 44 Teeth. / 15 Teeth.
L Tube Gear, 75 Teeth for 10-in. Coiler, 98 Teeth for 12-in. Coiler.
L^1 Can Bottom Intermediate Gear { 17 Teeth for 10-in. Coiler. / 22 Teeth for 12-in. Coiler.
L^2 Can Bottom Gear, 84 Teeth.
M Top Calender Gear, 34 Teeth.
M^1 Top Calender, $4\frac{1}{4}$ in. dia.

REVOLVING FLAT CARDS.

DRAFT CALCULATIONS.

Rules:

$$\frac{T \times A^2 \times B^1 \times C^2 \times F^2 \times \text{dia. of } I^2}{A^1 \times C \times F \times G \times \text{dia. of } T^1} = \text{Draft Constant.}$$

$$\frac{\text{Draft Constant}}{\text{Draft Change Gear (B)}} = \text{Draft.}$$

$$\frac{\text{Draft Constant}}{\text{Draft required}} = \text{Draft Change Gear (B).}$$

Examples:

If Plate Bevel Gear (A^2) = 120 T, Side Shaft Bevel Gear (B^1) = 22 T, Doffer Bevel Gear (C) = 22 T. All other gears standard.

$$\frac{48 \times 120 \times 22 \times 180 \times 24 \times 2}{17 \times 22 \times 19 \times 16 \times 6} = 1604.95 = \text{Draft Constant.}$$

If Draft Change Gear (B) = 18 T,

$$\frac{1604.95}{18} = 89.2 = \text{Draft.}$$

If Draft required = 100,

$$\frac{1604.95}{100} = 16 \text{ T} = \text{Draft Change Gear (B).}$$

PRODUCTION CALCULATIONS.

Rule:

$$\frac{\text{R. P. M. of Cylinder} \times \text{dia. of } N^1 \times \text{dia. of } O^1 \times P^1 \times Q^1}{\text{dia. of } O \times \text{dia. of } P \times Q \times C^2} = \text{R. P. M. of Doffer.}$$

Example:

If R. P. M. of Cylinder = 165, Barrow Spur Gear (P^1) = 26 T, Doffer Change Gear (Q^1) = 29 T. All other gears standard.

$$\frac{165 \times 19 \times 6 \times 26 \times 29}{7 \times 9 \times 104 \times 180} = 12.03 \text{ R. P. M. of Doffer.}$$

Rule:

$$\frac{\text{R. P. M. of Doffer} \times C^2 \times F^2 \times \text{Circum. of } I^2 \times \text{Wt. of Sliver in grains} \times 600 \text{ (min. in 10 hours)}}{F \times G \times 7{,}000 \text{ (grains in 1 lb.)} \times 36 \text{ inches in 1 yd.)}} = \text{Lbs. in 10 hours}$$

Example:

If R. P. M. of Doffer = 12. Sliver 60 grains per yd. Five per cent. allowance for cleaning, stripping, etc. All gears standard.

$$\frac{12 \times 180 \times 24 \times 6.283 \times 60 \times 600 \times .95}{19 \times 16 \times 7{,}000 \times 36} = 145 \text{ lbs. in 10 hours.}$$

Short rule for production in lbs. per 10 hours with standard gears and 5 per cent. allowance for cleaning, stripping, etc.

.202 x R. P. M. of Doffer x grains per yd. of Sliver = Lbs. in 10 hours.

To find the proper Doffer Change Gear for any required production, determine the proper R. P. M. of Doffer for the weight of Sliver in use from table on page 20, and then select the corresponding Doffer Change Gear by referring to table on page 19.

REVOLVING FLAT CARD

DOFFER CHANGE GEAR TABLE
10″ Coiler with 19T Calender Change Gear

Doffer Change Gear	Rev. per Min. of 26-in. Doffer based on 165 Rev. per Min. of Cylinder		
	Barrow Spur Gear		
	24 Teeth	26 Teeth	28 Teeth
17	6.51	7.05	7.59
18	6.89	7.46	8.04
19	7.27	7.88	8.49
20	7.66	8.29	8.93
21	8.04	8.71	9.38
22	8.42	9.12	9.83
23	8.80	9.54	10.27
24	9.19	9.95	10.72
25	9.57	10.37	11.17
26	9.95	10.78	11.61
27	10.34	11.20	12.06
28	10.72	11.61	12.50
29	11.10	12.03	12.95
30	11.48	12.44	13.40
31	11.87	12.86	13.84
32	12.25	13.27	14.29
33	12.63	13.68	14.74
34	13.02	14.10	15.18
35	13.40	14.51	15.63
36	13.78	14.93	16.08
37	14.16	15.34	16.52
38	14.55	15.76	16.97
39	14.93	16.17	17.42
40	15.31	16.59	17.86

NOTE—Licker-in Driving Pulley, 19 in. dia.
Licker-in Driven Pulley, 7 in. dia.
Barrow Gear Driving Pulley, 6 in. dia.
Barrow Gear Driven Pulley, 9 in. dia.
Doffer Lever Intermediate Gear, 104 Teeth.
Doffer Gear, 180 Teeth.

REVOLVING FLAT CARD.

PRODUCTION PER DAY OF TEN HOURS.

Doffer 26" Dia.	Weight in grains of one yard of Sliver												
	30	35	40	45	50	55	60	65	70	75	80	85	90
R. P. M.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
6	36	42	18	55	61	67	73	79	85	91	97	103	109
6½	39	46	53	59	66	72	79	85	92	98	105	112	118
7	42	49	57	64	71	78	85	92	99	106	113	120	127
7½	45	53	61	68	76	83	91	98	106	114	121	129	136
8	48	57	65	73	81	89	97	105	113	121	129	137	145
8½	51	60	69	77	86	94	103	112	120	129	137	146	154
9	55	64	73	82	91	100	109	118	127	136	145	154	164
9½	58	67	77	86	96	106	115	125	134	144	153	163	173
10	61	71	81	91	101	111	121	131	141	151	162	172	182
10½	64	74	85	95	106	117	127	138	148	159	170	180	191
11	67	78	89	100	111	122	133	144	155	167	178	189	200
11½	70	81	93	105	116	128	139	151	163	174	186	197	209
12	73	85	97	109	121	133	145	157	170	182	194	206	218
12½	76	88	101	114	126	139	151	164	177	189	202	215	227
13	79	92	105	118	131	144	158	171	184	197	210	223	236
13½	82	95	109	123	136	150	164	177	191	204	218	232	245
14	85	99	113	127	141	156	170	184	198	212	226	240	254
14½	88	102	117	132	146	161	176	190	205	220	234	249	264
15	91	106	121	136	151	167	182	197	212	227	242	257	273
15½	94	110	125	141	157	172	188	203	219	235	250	266	282
16	97	113	129	145	162	178	194	210	226	242	258	275	291
16½	100	117	133	150	167	183	200	217	233	250	267	283	300
17	103	120	137	154	172	189	206	223	240	257	275	292	309
17½	106	124	141	159	177	194	212	230	247	265	283	300	318
18	109	127	145	164	182	200	218	236	254	273	291	309	327

NOTE 5 per cent. has been deducted in the above table for cleaning, stripping, etc.

REVOLVING FLAT CARD.

DRAFT TABLE.

Draft Change Gear	Plate Bevel Gear, 120 T. Side Shaft Bevel, 22 T. Doffer Bevel Gear, 22 T. Draft Constant, 1604.95	Plate Bevel Gear, 120 T. Side Shaft Bevel, 34 T. Doffer Bevel Gear, 24 T. Draft Constant, 2273.68	Plate Bevel Gear, 170 T. Side Shaft Bevel, 31 T. Doffer Bevel Gear, 24 T. Draft Constant, 3221.05
10	160.5		
11	145.9		
12	133.7	189.5	
13	123.5	174.9	
14	114.6	162.4	230.0
15	107.0	151.6	214.7
16	100.3	142.1	201.3
17	94.4	133.7	189.5
18	89.2	126.3	179.0
19	84.5	119.7	169.5
20	80.2	113.7	161.0
21	76.4	108.3	153.4
22	73.0	103.3	146.4
23	69.8	98.9	140.0
24	66.9	94.7	134.2
25	64.2	90.9	128.8
26	61.7	87.4	124.0
27	59.4	84.2	119.3
28	57.3	81.2	115.0
29	55.3	78.4	111.1
30	53.5	75.8	107.4

NOTE—The draft is figured between the 6 in. dia. Lap Roll and 2 in. dia. Coiler Calender Rolls.

DECIMAL EQUIVALENTS.

1 ounce = 437.5 grains		11 ounces = 4812.5 grains	
2 ounces = 875 grains		11½ ounces = 5031.25 grains	
3 ounces = 1312.5 grains		12 ounces = 5250 grains	
4 ounces = 1750 grains		12½ ounces = 5468.75 grains	
5 ounces = 2187.5 grains		13 ounces = 5687.5 grains	
6 ounces = 2625 grains		13½ ounces = 5906.25 grains	
7 ounces = 3062.5 grains		14 ounces = 6125 grains	
8 ounces = 3500 grains		14½ ounces = 6343.75 grains	
9 ounces = 3937.5 grains		15 ounces = 6562.5 grains	
10 ounces = 4375 grains		15½ ounces = 6781.25 grains	
10½ ounces = 4593.75 grains		16 ounces = 7000 grains	

CARD CLOTHING.

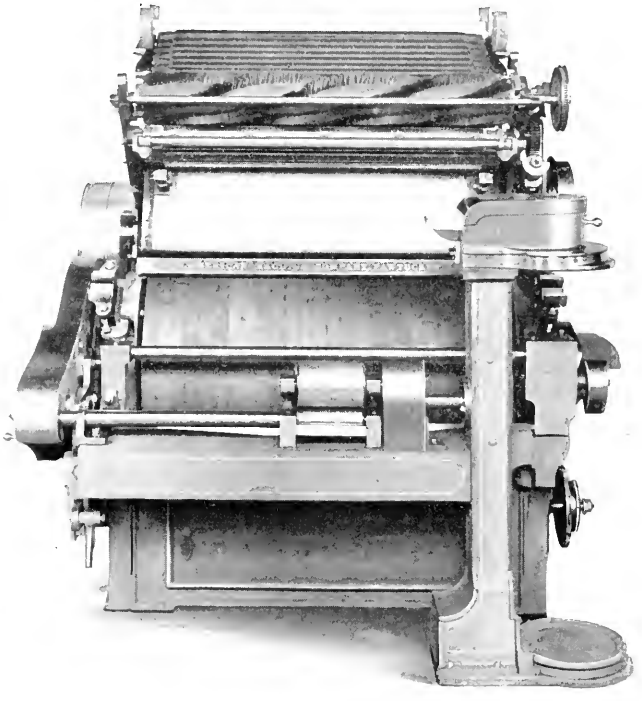
The English system of numbering Card Clothing is now generally used by Cotton Mills. We give below the numbers and points per square foot:

Numbers	Pts. per Square Foot	Numbers	Pts. per Square Foot
80s . .	57,600	110s . .	79,200
90s . .	64,800	120s . .	86,400
100s . .	72,000	130s . .	93,600

The following numbers are generally used for Cylinders: Coarse, heavy work, 80s and 90s; medium to fine work, 100s and 110s; fine work, 120s and 130s.

Doffers are usually 10 numbers higher or finer than Cylinders.

There is considerable variation in the Clothing used for Tops. Some prefer thinner set than the Cylinders, others about the same as the Cylinders, and a few the same numbers as the Doffers.



REVOLVING FLAT CARD (FRONT VIEW)

MODEL "A"
DRAWING FRAMES

DRAWING FRAME (ONE HEAD OF FOUR DELIVERIES)—ELECTRIC STOP MOTIONS

MODEL "A"
DRAWING FRAMES

We build both Electric and Mechanical Stop Motion Frames.

The quality of sliver produced by these machines is unsurpassed; a great saving in waste "single" and roller laps is effected, and production is increased.

Machines stop:

1st—When sliver breaks at back or a can runs out.

2d—When top or bottom front roll laps up.

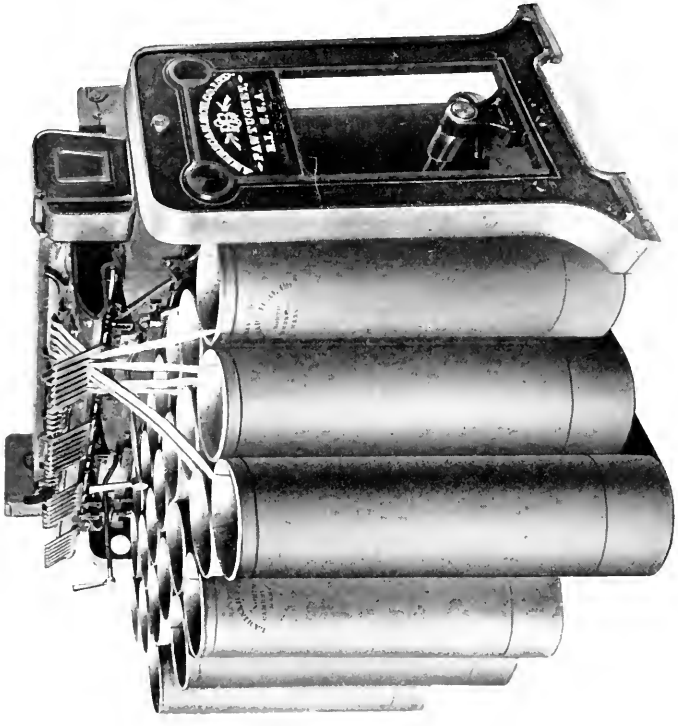
3d—When sliver breaks in front.

4th—When cans are full.

5th—When back electric roll or clearer laps up.

On account of the positive and quick action of the Electric Stop Motions, machines can be run at a much higher speed, in case of necessity, than Mechanical Stop Motion Frames.

The tops of Electric Stop Motion Frames, being free from the many small parts and projections which are a necessity on Mechanical Stop Motion Frames, are much more easily kept clean, and "fly" is not carried into the sliver, besides which a great many delicate and troublesome Mechanical Stop Motion parts are done away with.



DRAWING FRAME (ONE HEAD OF FOUR DELIVERIES) MECHANICAL STOP MOTIONS

FRAMING AND CONSTRUCTION—The machines are built with low, rigid framing. Can tables set into or on top of the floor.

BOTTOM FLUTED ROLLS are made in one length and are irregularly fluted so as to prevent cutting of top rolls. The usual diameters are 1⅜ in. front, 1⅛ in. second, third and fourth lines.

TOP ROLLS are usually 1 in. dia. on iron. The front line can have Loose Boss or Loose Ends; the latter are now in extensive use and are generally preferred.

ROLLER STANDS are made with separate adjustable slides or bearings, so arranged that the top and bottom rolls move together when setting for different lengths of staple. The Roller Stands and Slides have brasses cast in them for roller bearings.

CALENDER ROLLS are made of steel, turned, ground and polished.

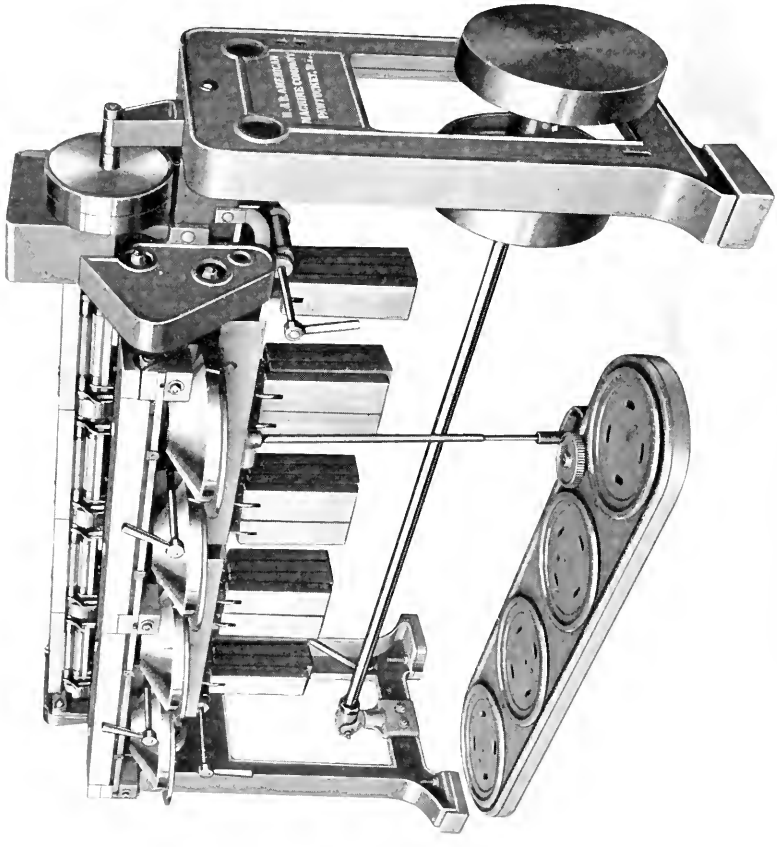
DRAFT GEARING—All Draft and Roller Gears are cut. Changes of Draft are very easily made, and the gearing is well protected with polished covers.

COILERS are made for cans 36 ins. long, 9, 10, 11 or 12 ins. dia. as required.

TENSION—Our fine pitch gearing for the take-up of the sliver between the fluted rolls and the Calender rolls enables a nice adjustment to be made for either ordinary or metallic rolls, and reduces the stretching, sagging and breakage of the sliver, preventing stoppage and waste.

TRUMPETS—These are made separate from the calender plates and can easily be taken out. This method is an advantage, as trumpets wear in time and when worn do not sufficiently condense the sliver. With this system they can easily be replaced.

BACK GUIDES for both Electric and Mechanical Stop Motion Frames are designed so as to separate the slivers and keep kinks from going into the rolls, thus preventing lumpy and uneven work.



FRONT VIEW OF DRAWING FRAME WITH CANS REMOVED

CLEARERS—Both top and bottom rolls have Clearers. We apply a patented and very successful Clearer to the Calender rolls which prevents fly from sticking to them and being carried into the sliver.

WEIGHT RELIEVING MOTION—This is applied to all frames for taking the pressure off the rolls when the frames are stopped.

All rolls are weighted separately. Usual weights are 20 lbs. front line; 18 lbs. second line; 16 lbs. third line; 14 lbs. fourth line.

TRAVERSE MOTION is applied to all frames with leather covered top rolls.

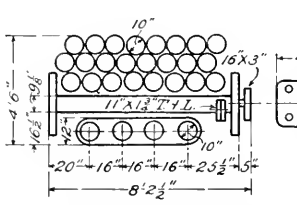
METALLIC TOP AND BOTTOM ROLLS—The front bottom roll is usually $1\frac{3}{8}$ in. dia., and the other three lines of bottom rolls as well as the top rolls, all $1\frac{1}{8}$ in. dia.

Front and second lines are usually 32 pitch; third line 24 pitch and back line 16 pitch. The top rolls have Loose Ends. Weights usually 14 lbs. on all lines.

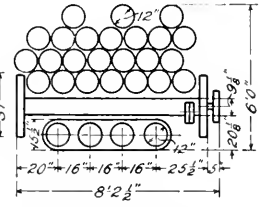
ERMEN TOP CLEARERS—The cloth of these Clearers revolves over 2 rolls (one of which is positively driven) and comes in contact with all the top rolls. This revolving clearer is placed inside of our top clearer cover, and is stripped by a Comb through an opening in the top of the cover. This clearer meets with great favor in fine mills, where combed long staple cotton is worked.

DRIVING PULLEY AND SPEED—The Driving Pulley on the Bottom Shaft is usually 16 in. dia., 3 in. or 4 in. face and can be placed at either end of the frame. The usual speed of this shaft is 250 r. p. m., which gives a calculated speed of 363 r. p. m. of Front Roll. One rev. of shaft equals $1\frac{5}{11}$ of Front Roll.

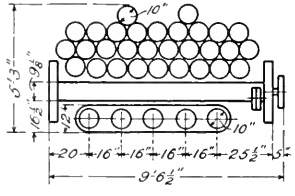
FLOOR PLANS OF DRAWING FRAMES



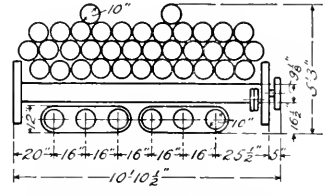
ONE HEAD OF FOUR DELIVERIES.
10" COILER.



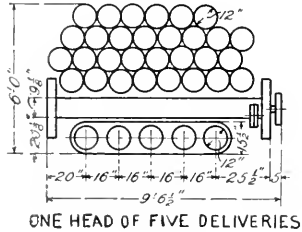
ONE HEAD OF FOUR DELIVERIES
12" COILER.



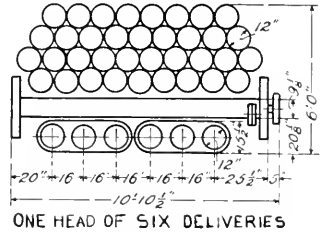
ONE HEAD OF FIVE DELIVERIES
10" COILER.



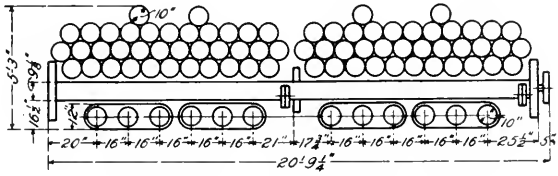
ONE HEAD OF SIX DELIVERIES.
10" COILER.



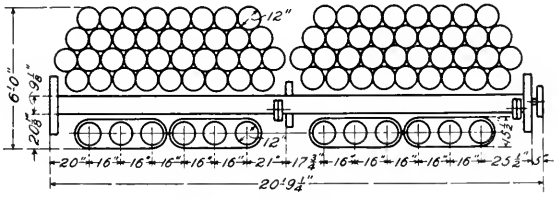
ONE HEAD OF FIVE DELIVERIES
12" COILER.



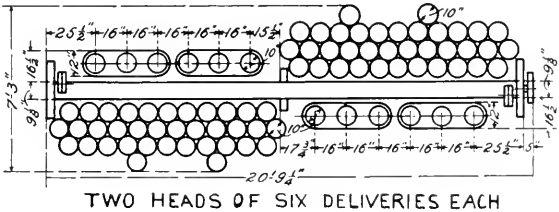
ONE HEAD OF SIX DELIVERIES
12" COILER.



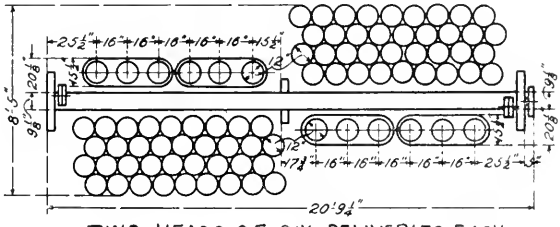
TWO HEADS OF SIX DELIVERIES EACH.
10" COILER.



TWO HEADS OF SIX DELIVERIES EACH
12" COILER.



TWO HEADS OF SIX DELIVERIES EACH
10" COILER ZIGZAG.



TWO HEADS OF SIX DELIVERIES EACH.
12" COILER ZIGZAG

LENGTHS OF DRAWING FRAMES, 16-IN. GAUGE.

Number of Heads per Frame	Number of Deliveries per Head						
	2	3	4	5	6	7	8
1	5'-6 1/2"	6'-10 1/2"	8'-2 1/2"	9'-6 1/2"	10'-10 1/2"	12'-2 1/2"	13'-6 1/2"
2	10'-1 1/4"	12'-9 1/4"	15'-5 1/4"	18'-1 1/4"	20'-9 1/4"	23'-5 1/4"	26'-1 1/4"
3	14'-8"	18'-8"	22'-8"	26'-8"	30'-8"	34'-8"	38'-8"
4	19'-2 3/4"	24'-6 3/4"	29'-10 3/4"	35'-2 3/4"	40'-6 3/4"	45'-10 3/4"	51'-2 3/4"
5	23'-9 1/2"	30'-5 1/2"	37'-1 1/2"	43'-9 1/2"	50'-5 1/2"	57'-1 1/2"	63'-9 1/2"
6	28'-4 1/4"	36'-4 1/4"	44'-4 1/4"	52'-4 1/4"	60'-4 1/4"	68'-4 1/4"	76'-4 1/4"
7	32'-11"	42'-3"	51'-7"	60'-11"	70'-3"	79'-7"	88'-11"
8	37'-5 3/4"	48'-1 3/4"	58'-9 3/4"	69'-5 3/4"	80'-1 3/4"	90'-9 3/4"	101'-5 3/4"
Add for each Additional Head	4'-6 3/4"	5'-10 3/4"	7'-2 3/4"	8'-6 3/4"	9'-10 3/4"	11'-2 3/4"	12'-6 3/4"

Above lengths are over all, including Driving Pulley.

For widths, see Floor Plans, pages 32 and 33.

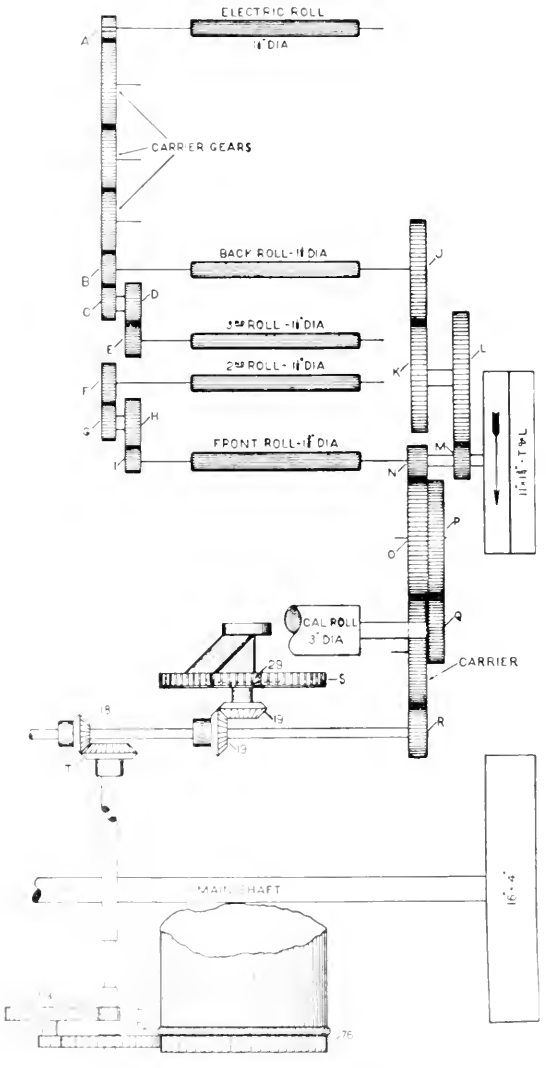
Drawing Frames are usually made with 4, 5 or 6 deliveries per head or table, and 2, 3 or 4 heads per frame, but can be made with more or less deliveries per head, and more or less heads per frame.

DRAWING FRAMES.

PRODUCTION PER DAY OF TEN HOURS.

	R. P. M. of 1 3/8" dia. Front Roll	Weight in grains of one yard of Sliver													
		35	40	45	50	55	60	65	70	75	80	85	90	95	100
		Lbs	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Common Rolls	250	75	85	96	106	117	128	138	149	160	170	181	192	202	213
	275	82	94	105	117	129	141	152	164	176	187	199	211	223	234
	300	89	102	115	128	141	153	166	179	192	204	217	230	243	256
	325	97	111	125	138	152	166	180	194	208	222	235	249	263	277
	350	104	119	134	149	164	179	194	209	224	239	253	268	283	298
	375	112	128	144	160	176	192	208	224	240	256	272	288	304	320
	400	119	136	153	170	187	204	222	239	256	273	290	307	324	341
	425	127	145	163	181	199	217	235	253	272	290	308	326	344	362
	450	134	153	173	192	211	230	249	268	288	307	326	345	364	383
Metallic Rolls	250	99	113	127	141	155	169	183	197	211	225	239	253	267	282
	275	108	124	139	155	170	186	201	217	232	248	263	279	294	310
	300	118	135	152	169	186	203	220	236	253	270	287	304	321	338
	325	128	146	165	183	201	220	238	256	274	293	311	329	348	366
	350	138	158	177	197	217	236	256	276	296	315	335	355	374	394
	375	148	169	190	211	232	253	274	296	317	338	359	380	101	422
	400	158	180	203	225	248	270	293	315	338	360	383	405	428	450
	425	167	191	215	239	263	287	311	335	359	383	107	431	455	479
	450	177	203	228	253	279	301	329	355	380	405	431	456	481	507

NOTE—In the above table 20 per cent. has been deducted for stops, cleaning, etc.



DRAFT GEARING FOR DRAWING FRAMES

DRAWING FRAMES.

ALPHABETICAL REFERENCES TO DIAGRAM.

A Electric Roll Gear, 24 Teeth for Common Rolls, 20 Teeth for Metallic Rolls.

B Off End Back Roll Gear, 24 Teeth for Common Rolls, 29 Teeth for Metallic Rolls.

C Small Double Intermediate, driving 3d Roll.

D Large Double Intermediate, driving 3d Roll, 40 Teeth for Common Rolls, 36 Teeth for Metallic Rolls.

E Off End 3d Roll Gear, 24 Teeth.

*F Off End 2d Roll Gear.

*G Small Double Intermediate, driving 2d Roll.

*H Large Double Intermediate, driving 2d Roll.

I Off End Front Roll Gear, 20 Teeth.

J Back Roll Gear, 45 to 80 Teeth.

K Draft Change Gear, 45 to 70 Teeth.

*L Crown Gear.

*M Front Roll Gear.

N Front Roll Calender Driving Gear, 16 Teeth for Common Rolls, 19 Teeth for Metallic Rolls.

O and P Double Intermediate Gear, 52 and 91 Teeth for 10-in. Coiler, 62 and 108 Teeth for 12-in. Coiler.

Q Calender Roll Gear, 58, 59, 60 Teeth for Common Rolls, 52, 53, 54 Teeth for Metallic Rolls.

R Coiler Horizontal Shaft Gear, 21 to 26 Teeth (driven by O through Carrier Gear).

S Tube Wheel, 75 Teeth for 10-in. Coiler, 98 Teeth for 12-in. Coiler.

T Coiler Vertical Shaft, Top Bevel Gear, 32 Teeth for 10-in. Coiler, 37 Teeth for 12-in. Coiler.

NOTE—For teeth on gears marked * refer to table on page 10.

DRAWING FRAMES.

DRAFT CALCULATIONS.

Rules:

$$\frac{A \times J \times L \times N \times P \times \text{dia. of Calender Roll}}{B \times M \times O \times Q \times \text{dia. of Electric Roll}} = \text{Draft Constant}$$

$$\frac{\text{Draft Constant}}{\text{Draft Change Gear (K)}} = \text{Draft.}$$

$$\frac{\text{Draft Constant}}{\text{Draft required}} = \text{Draft Change Gear (K).}$$

Examples:

If Common Rolls and 10-in. Coilers. Back Roll Gear (J) = 68 T. Crown Gear (L) = 98 T. Front Roll Gear (M) = 22 T.

$$\frac{24 \times 68 \times 98 \times 16 \times 91 \times 3}{24 \times 22 \times 52 \times 59 \times 1\frac{1}{8}\text{ in.}} = 383.34 \text{ Draft Constant.}$$

If Draft Change Gear (K) = 64 T.

$$\frac{383.34}{64} = 5.99 = \text{Draft.}$$

If Draft required = 5.48

$$\frac{383.34}{5.48} = 70 \text{ T.} = \text{Draft Change Gear (K).}$$

The above figures are for Total Draft up to and including the 3-in. dia. Calender Rolls. When Graduated Pitch Metallic Rolls are used, and it is desired to figure drafts between them, the following equivalents are approximately correct:

1⅜-in. dia. Roll, 32 pitch, taken as $1\frac{11}{16}$-in. or 1.83-in. dia.
1¼-in. dia. Roll, 32 pitch, taken as $1\frac{10}{16}$-in. or 1.67-in. dia.
1⅛-in. dia. Roll, 32 pitch, taken as $1\frac{8}{16}$-in. or 1.50-in dia.
1 -in. dia. Roll, 32 pitch, taken as $1\frac{5}{16}$-in. or 1.33-in. dia.
1¼-in. dia. Roll, 16 pitch, taken as $1\frac{10}{16}$-in. or 1.67-in. dia.
1 -in dia. Roll, 16 pitch, taken as $1\frac{8}{16}$-in. or 1.50-in. dia.

PRODUCTION CALCULATIONS

Rule:

$$\frac{\text{R. P. M. of Front Roll} \times N \times P \times \text{Circum. of Cal. Roll} \times \text{Wt. of Sliver in grains} \times 600 \text{ (min. in 10 hours)}}{O \times Q \times 7{,}000 \text{ (grains in 1 lb.)} \times 36 \text{ (inches in 1 yd.)}} = \text{Lbs. in 10 hours.}$$

Examples:

If *Common Rolls*, R. P. M. of $1\frac{3}{8}$-in. Front Roll = 350, Front Roll Calender Driving Gear (N) = 16 T., Double Intermediate Gear (O) = 52 T. and (P) = 91 T., Calender Roll Gear (Q) = 59 T., Circum. of 3-in. Cal. Roll = 9.425 in. Wt. of Sliver per yd. = 60 grains. Twenty per cent. allowance for stops, etc. 10-in. Coiler.

$$\frac{350 \times 16 \times 91 \times 9.425 \times 60 \times 600 \times .80}{52 \times 59 \times 7{,}000 \times 36} = 179 \text{ lbs. in 10 hours.}$$

If *Metallic Rolls*, R. P. M. of $1\frac{3}{8}$-in. Front Roll = 350, Front Roll Calender Driving Gear (N) = 19 T., Double Intermediate Gear (O) = 52 T. and (P) = 91 T., Calender Roll Gear (Q) = 53 T., Circum. of 3-in. Cal. Roll = 9.425 in. Wt. of Sliver per yd. = 60 grains. Twenty per cent. allowance for stops, etc. 10-in. Coiler.

$$\frac{350 \times 19 \times 91 \times 9.425 \times 60 \times 600 \times .80}{52 \times 53 \times 7{,}000 \times 36} = 236 \text{ lbs. in 10 hours.}$$

The greater production with Metallic Rolls over Common Rolls for a given number of revs. is due to the meshing of the flutes, which increases the effective circum. of the rolls about 33 per cent. This accounts for the difference in the gears driving the Calender Rolls.

Short rules for production in 10 hours based on 20 per cent. allowance for stops, etc., and $1\frac{3}{8}$ in. dia. front bottom roll.

Common Rolls—.852 x R. P. M. of Front Roll x Wt. of Sliver in grains = Lbs. in 10 hours.

Metallic Rolls—1.126 x R. P. M. of Front Roll x Wt. of Sliver in grains = Lbs. in 10 hours.

DRAWING FRAMES.

GEARING COMBINATIONS, DRAFT CONSTANTS AND DRAFTS FOR MACHINES WITH 1 3/8-IN. FRONT ROLL.

	Number of Teeth in Gears								Draft Constant with 10-in. Coiler	Total Draft with 10-in. Coiler	Draft Constant with 12-in. Coiler	Total Draft with 12-in. Coiler
	C	F	G	H	J	K	L	M				
Common Rolls	36	29	30	38	45	68	94	26	205.90	3.03	204.95	3.01
	36	29	30	38	45	63	94	26	205.90	3.27	204.95	3.25
	36	30	29	40	45	59	94	26	205.90	3.49	204.95	3.47
	36	30	29	40	45	55	94	26	205.90	3.74	204.95	3.73
	36	30	26	40	48	67	98	22	270.60	4.04	269.35	4.02
	36	30	26	40	48	63	98	22	270.60	4.30	269.35	4.28
	36	34	26	40	48	60	98	22	270.60	4.50	269.35	4.48
	36	34	26	40	48	57	98	22	270.60	4.75	269.35	4.73
	36	34	24	40	48	54	98	22	270.60	5 01	269.35	4.99
	36	34	24	40	48	51	98	22	270.60	5.30	269.35	5.28
	36	36	24	40	68	70	98	22	383.34	5.48	381.58	5.45
	36	36	24	40	68	67	98	22	383.34	5.72	381.58	5.70
	36	38	24	40	68	64	98	22	383 34	5.99	381.58	5.96
	36	38	24	40	68	61	98	22	383.34	6.28	381.58	6.25
	36	38	24	40	68	59	98	22	383.34	6,50	381.58	6.47
	36	38	24	40	68	57	98	22	383.34	6.73	381.58	6.70
Metallic Rolls (Graduated Pitch)	33	26	32	40	48	66	94	26	200.22	3.04	199 30	3.02
	33	26	32	40	48	61	94	26	200.22	3.28	199.30	3.26
	33	26	32	40	48	57	94	26	200.22	3.51	199.30	3.50
	33	26	32	40	48	53	94	26	200.22	3.78	199.30	3.76
	33	28	32	40	53	68	98	22	272.40	4.01	271.14	3.99
	33	28	32	40	53	64	98	22	272.40	4.26	271.14	4.24
	31	28	30	40	53	60	98	22	272.40	4.54	271.14	4.52
	31	28	30	40	53	57	98	22	272.40	4.78	271.14	4.76
	31	30	30	40	53	54	98	22	272.40	5.04	271.14	5.02
	31	30	30	40	66	64	98	22	339.20	5.30	337.64	5.28
	31	32	30	40	66	61	98	22	339.20	5.56	337.64	5.54
	31	32	30	40	66	59	98	22	339 20	5.75	337.64	5.73
	31	33	30	40	66	56	98	22	339.20	6.06	337.64	6 03
	31	33	30	40	66	54	98	22	339.20	6.28	337.64	6.25
	31	33	30	40	66	52	98	22	339.20	6.52	337.64	6.49
	31	33	28	40	66	50	98	22	339.20	6.78	337.64	6.75

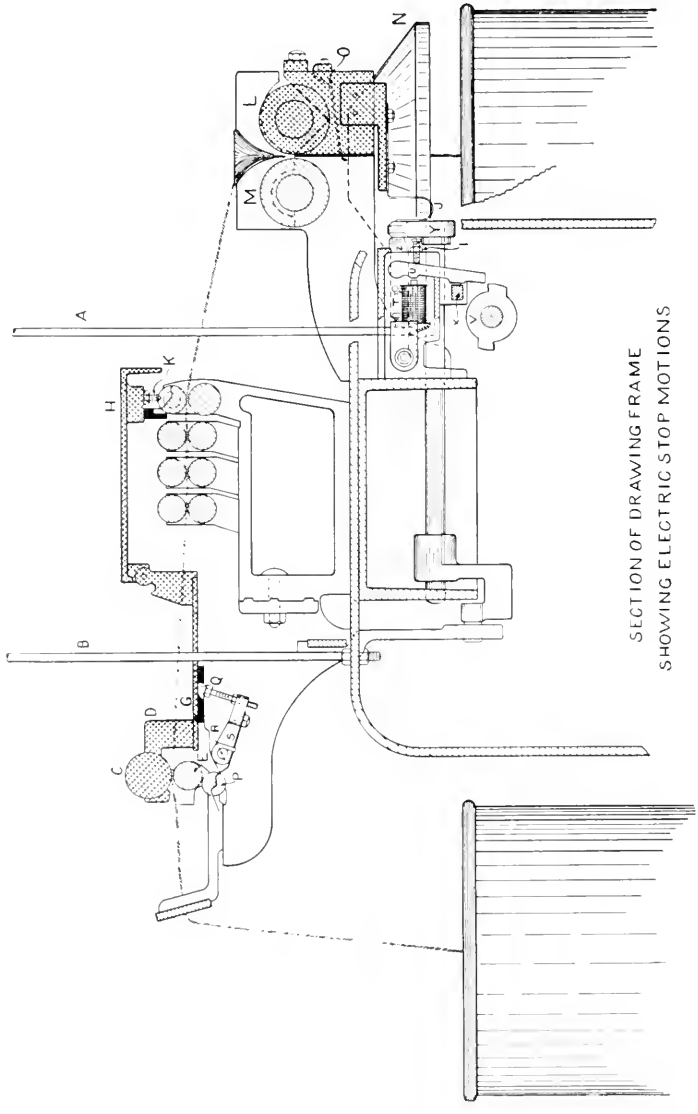
The above constant and drafts are figured up to and including the 3-in. Calender Rolls. Draft Gear K is the usual change gear.

When making extreme draft changes the best results will be obtained by following the above arrangements of gearing.

TABLE FOR NUMBERING CARD OR DRAWING SLIVERS.

Grains per Yard	Hank	Grains per Yard	Hank	Grains per Yard	Hank	Grains per Yard	Hank
30	.278	48	.174	66	.126	84	.099
31	.269	49	.170	67	.124	85	.098
32	.260	50	.167	68	.122	86	.097
33	.252	51	.163	69	.121	87	.096
34	.245	52	.160	70	.119	88	.095
35	.238	53	.157	71	.117	89	.094
36	.232	54	.154	72	.116	90	.093
37	.225	55	.151	73	.114	91	.092
38	.219	56	.149	74	.113	92	.091
39	.214	57	.146	75	.111	93	.090
40	.208	58	.144	76	.110	94	.089
41	.203	59	.141	77	.108	95	.088
42	.198	60	.139	78	.107	96	.087
43	.194	61	.137	79	.105	97	.086
44	.189	62	.134	80	.104	98	.085
45	.185	63	.132	81	.103	99	.084
46	.181	64	.130	82	.102	100	.083
47	.177	65	.128	83	.100		

8.333 ÷ Wt. in grains of 1 yd. of Sliver = Hank.
8.333 ÷ Hank = Wt. in grains of 1 yd. of Sliver.
100 ÷ Wt. in grains of 12 yds. of Sliver = Hank.



SECTION OF DRAWING FRAME
SHOWING ELECTRIC STOP MOTIONS

EXPLANATION OF ELECTRIC STOP MOTIONS.

The Drawing Frame is divided into two parts by means of insulations (indicated by the solid black portions of cut on opposite page). One part, shown with double cross lines, is connected to the Magneto through the down-rod A, and the other part through the down-rod B.

It will be seen that in the case of each Stop Motion the parts are kept from touching each other by cotton passing between them (cotton being a non-conductor of electricity) or are brought into contact with each other by rollers lapping up or by the pressure of the cotton in the full cans.

The machine stops when the electric circuit is completed, allowing the current to flow through Magnet T, which attracts finger U into engagement with Revolving Clutch V, and by a mechanical arrangement shifts the belt on to the loose pulley.

As the frame stops, the part X forces the finger U away from the Clutch, and the current is broken by the piece Y which moves out of contact with the spring Z. When the frame is running, Y is in contact with both the springs Z and J. As the machine stops, the movement of Y takes it out of contact with Z, but J should always press against Y.

STOP MOTION No. 1—C is the top electric roll which rests in Cap Bar D, and E is the bottom electric roll. As long as the sliver remains between the rolls they are kept apart and there is no circuit. When the sliver breaks or a can runs out the rolls come together and the frame knocks off.

STOP MOTION No. 2—The Top Clearer Cover H has a screw K on the under side. If the cotton laps around the top or bottom front roll, the top roll is lifted and comes in contact with screw K, which completes the circuit and the machine stops.

STOP MOTION No. 3—The cotton sliver prevents the calender rolls L and M from touching each other. If the sliver breaks, the rolls touch and the machine stops instantly.

STOP MOTION No. 4—When the cans at the front are full and cotton presses against the coiler top N, it is lifted into contact with the spring O, and the circuit is completed, stopping the machine.

STOP MOTION No. 5—The Underclearer P presses against the bottom electric roll E. In case the cotton laps around E or P, the screw Q is lifted and touches the Back Plate G, completes the circuit and the frame knocks off.

Electric Current for the Stop Motions is furnished by a small transformer or may be made by a small magneto.

DATE DUE